REMARKS

Overview of the Office Action

The drawings have been objected to for not showing each feature recited in the claims

Claims 1, 2, 4, 6, and 8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Appl. Pub. No. 2002/0154690 ("Okazaki") in view of U.S. Patent Appl. Pub. No. 2002/0181576 ("Kennedy"), and further in view of U.S. Patent No. 6,813,325 ("Lin").

Claim 3 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki, Kennedy, and Lin, and further in view of U.S. Patent No. 7,027,499 ("Peon").

Claim 7 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki, Kennedy, and Lin, and further in view of U.S. Patent No. 5,909,466 ("Labat").

Claim 9 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Okazaki, Kennedy, and Lin, and further in view of "Turbo Equalization: Adaptive Equalization and Channel Decoding Jointly Optimized" ("Laot").

Status of the claims

Claims 1 and 8 have been amended.

Claims 5 and 10 have been previously canceled.

Claim 9 has now been canceled.

Claims 1-4 and 6-8 remain pending.

Objections to the drawings

The Office Action states that drawings have been objected to for not showing the turbo equalization system recited in claim 9. Claim 9 has been canceled rendering this objection moot.

Rejection of claims 1, 2, 4, 6, and 8 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, and Lin teaches all of Applicants' recited elements.

Independent claim 1 has been amended to recite a method for synchronizing symbols at an output of a blind equalizer that includes "on sending, inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols", and "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols", which Okazaki, Kennedy, and Lin, whether taken alone or in combination, fail to teach or suggest. Support for the claim amendment can be found in paragraph [0046] of Applicants' published specification.

Applicants' recited method performs synchronizations of symbols by modifying the content of the succession of symbols at the output of a blind equalizer.

According to Applicants' recited method, successions of symbols d(n) are sent over a transmission channel (see Fig. 1 of Applicants' specification). At the output of this transmission channel, the resulting symbols r(n) are received and processed in a receiver that includes a blind equalizer 1 which receives at its input the symbols r(n), which are filtered beforehand, where applicable, and processor means 2 which processes the data y(n) at the output of the equalizer 1 to limit the effect thereon of the loss of timing phenomenon (see paragraph [0033] and Fig. 2 of Applicants' specification). The processing effected by the processor means 2 includes detecting,

in the frames of symbols at the output of the blind equalizer 1, known synchronization sequences SYNCH previously inserted into the frames of symbols d(n) at regular intervals, deducing any shift in the symbols processed by the equalizer 1, such as by detecting a shift in the known synchronization sequences, and retiming the data at the output of the equalizer as a function of the deduced shift by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer between a synchronization sequence for which a shift is detected and a preceding synchronization sequence, where the number of symbols added or eliminated corresponding to the deduced shift of the symbols (see paragraphs [0034]-[0046] and Figs. 3a-3c of Applicants' specification).

The above-described recited features enable easy monitoring of the synchronization of a succession of symbols and rapid detection of a loss of timing phenomenon. Moreover, Applicants' recited invention enables effective correction of this loss of timing by having a retiming adapted to the shift detected.

The Examiner concedes that Okazaki fails to teach or suggest, "on sending, inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols", and "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence", as expressly recited in independent claim 1.

The Examiner cites paragraphs [0027]-[0029] of Kennedy as teaching inserting into a succession of sent symbols, one or more known synchronization sequences of symbols repeated at regular intervals in said succession of symbols. Applicants disagree.

Kennedy discloses a magnitude only equalizer that equalizes a <u>magnitude</u> of a received wireless signal without regard to phase distortions introduced, and transmits the magnitude equalized signal to a timing recovery loop for improved correlation peak detection in a sync based timing recovery scheme. A channel equalizer receiving the output signal from the timing recovery loop equalizes the signal and corrects any phase distortions introduced by the magnitude only equalizer. The magnitude only equalizer of Kennedy includes at least one filter utilizing only real coefficients and constrained such that the direct term of the overall filter structure within the magnitude only equalizer is unity (see Abstract of Kennedy). To demonstrate the resulting improvement Kennedy describes simulation results obtained by using a 4-bit synchronization sequence SYNC each 832 signals (see paragraph [0027] of Kennedy).

Since Kennedy relates to equalizing a magnitude of a signal, Kennedy is not concerned with, and does not address, the loss of timing issue at the output of a blind equalizer. Consequently, Kennedy fails to teach or suggest "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols", as recited in Applicants' amended claim 1.

The Examiner, however, cites col. 3, lines 45-65, col. 7, lines 9-48, and col. 9, lines 5-32 of Lin as teaching retiming frames by eliminating from, or adding to, the succession of bits between two synchronization sequences. Applicants disagree.

Lin is directed to a system and method for reducing transmit carrier wander in a DSL communication system. According to Lin, a network timing reference unit provides an

automatic embedded solution for synchronizing DSL frames to <u>an external communication system reference clock</u>. The network timing reference unit of Lin applies or removes bits to adjust the length of a DSL frame in response to a sliding window state table. A sliding window is selected in response to the relative position of the DSL frame to a system clock reference point over a number of DSL frames. Further, according to Lin, the method can be described as: receiving <u>a network clock</u> and a DSL data stream comprising a plurality of frames; identifying a reference point on the network clock signal; identifying a DSL frame reference point; recording the relative position of the DSL frame reference point to the network clock reference point; performing a bit-manipulation responsive to the relative reference positions and a current window position; and adjusting the current window position in response to a consistent relative reference position between the network clock and DSL frame reference points (see Abstract of Lin).

The Examiner-cited passages of Lin simply disclose that a DSP 220 within the HTU-R 244 includes a network timing reference unit 300 and at least one sliding window state table 222, 224. The network timing reference unit 300 of Lin receives an <u>external timing reference signal 275</u> as well as a series of HDSL frames. The network timing reference unit 300 of Lin is configured to apply the delete and stuffing bits D1, D2, S1, and S2 in at least one of the sliding window state tables 222, 224, respectively.

According to Lin, the sliding window register input 365 is coupled to the sliding window register 360 to select an initial sliding window (i.e., window 1, 2, 3, or 4) for the NTRU 300. Similarly, the sensitivity buffer input 399 of Lin is coupled to the sensitivity buffer 390 in order to store a sensitivity threshold, M. The timing reference signal 275 of Lin is coupled to an input of the counter 310, which is configured to trigger a reference clock latch input signal 315 upon receipt of

the X^{th} clock transition. Having received an indication that the X^{th} clock transition has occurred, the reference clock latch 320 of Lin is configured to indicate the same via a first lead/lag comparator input 325. This, in turn, causes the lead/lag comparator 330 of Lin to receive first and second lead/lag comparator inputs 325, 355, respectively, and provide an output signal 335 that indicates whether the DSL frame synchronization word is leading or lagging the timing reference signal 275 (see Fig. 4 and col. 7, line 49 to col. 8, line 14 of Lin).

Further, a sliding window state table 222, 224 of Lin is configured to receive the lead/lag comparator output signal 335. Together, the lead/lag comparator output signal 335 and the sliding window register input signal of Lin identify the appropriate stuff/delete bits to be applied to the DSL frame to correct the relative timing of the DSL frame to the timing reference signal 275 (see Fig. 4 and col. 8, lines 15-25 of Lin).

Thus, Lin clearly teaches that the DSL frame is retimed by comparing the DSL frame to a an external reference clock, determining the offset of DSL frame from the reference clock, and adding or deleting bits to adjust the DSL frame to be synchronous with the external reference clock.

Moreover, the number of bits inserted in or deleted from the DSL frame does not correspond to a shift deduced from the detection of a synchronization sequence, as recited in Applicants' amended claim 1. Instead, Lin discloses that a predetermined bit-manipulation is applied on the DLS frame, depending on whether a lead or a lag of the DSL frame timing with respect to the external reference clock has been identified (only a relative position is considered, see col. 3 lines 38-42, col. 8 5lines 6-14 of Lin). The list of predetermined bit-manipulations including designated bits to be inserted or deleted is stored in a sliding window state table. Transition from one sliding window (i.e. from one bit-manipulation) to another is subject to the

number of times a DSL frame leads or lags behind the timing reference signal (see col. 8 lines 34-56 of Lin).

Since Lin requires an external clock, Lin fails to disclose "retiming the symbols at the output of the blind equalizer, as a function of the deduced shift of the symbols, by eliminating symbols from or adding symbols to the succession of symbols at the output of the blind equalizer, between a synchronization sequence for which a shift is deduced and a preceding synchronization sequence, the number of symbols added or eliminated corresponding to the deduced shift of the symbols", as recited in Applicants' amended claim 1.

Furthermore, Lin does not at all address the technical problem of timing loss at the output of a blind equalizer. Consequently, a person with ordinary skills in the art would not be motivated to look to Lin to for a blind equalizer output synchronization solution to apply to a device produced by combining the teachings of Okazaki and Kennedy.

In view of the foregoing, Applicants submit that Okazaki, Kennedy, and Lin, whether taken alone or in combination, fail to teach or suggest the synchronization method recited in amended claim 1. Accordingly, amended claim 1 is patentable over Okazaki, Kennedy, and Lin under 35 U.S.C. §103(a).

Independent claim 8 has been amended to recite limitations similar to independent claim 1 and is, therefore, patentable over Okazaki, Kennedy, and Lin for reasons discussed above with respect to independent claim 1.

Dependent claims

Claim 2, 4, and 6, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over

Okazaki, Kennedy, and Lin for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 3 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Lin, and Peon teaches all of Applicants' recited elements.

As previously discussed, Okazaki, Kennedy, and Lin do not teach or suggest the subject matter recited in Applicants' amended independent claim 1.

Because Okazaki, Kennedy, and Lin fail to teach or suggest the subject matter recited in amended independent claim 1, and because Peon fails to teach or suggest the elements of claim 1 that Okazaki, Kennedy, and Lin are missing, the addition of Peon fails to remedy the above-described deficiencies of Okazaki, Kennedy, and Lin.

Claims 3, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Okazaki, Kennedy, Lin, and Peon for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 7 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Lin, and Labat teaches all of Applicants' recited elements.

As previously discussed, Okazaki, Kennedy, and Lin fail teach or suggest the subject matter recited in Applicants' amended independent claim 1.

Because Okazaki, Kennedy, and Lin fail to teach or suggest the subject matter recited in amended independent claim 1, and because Labat fails to teach or suggest the elements of claim

1 that Okazaki, Kennedy, and Lin are missing, the addition of Labat fails to remedy the above-described deficiencies of Okazaki, Kennedy, and Lin.

Claim 7, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Okazaki, Kennedy, Lin, and Labat for at least those reasons discussed above with respect to independent claim 1.

Rejection of claim 9 under 35 U.S.C. §103(a)

The Office Action states that the combination of Okazaki, Kennedy, Lin, and Laot teaches all of Applicants' recited elements.

Claim 9 has been canceled rendering this rejection moot.

Conclusion

In view of the foregoing, reconsideration and withdrawal of all rejections, and allowance of all pending claims, are respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned

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